Appendix B
Explanations of Abbreviations and Terms

(a) Attachment -- the act of a bacteria or a biocolloid becoming fixed to a surface. Growth may then follow leading to the formation of biofilms.

(b) BART -- a patented biological activity reaction test biodetection system which can be customized to determine the aggressivity and composition of selected consortia of microorganisms.

(c) BCHT -- a patented blended chemical heat treatment system which can be applied to rehabilitate biofouled wells and systems by a three-step technology.

(d) Biocides -- specific chemicals or compounds which have a deleterious impact on the targeted organism.

(e) Biodegradation -- the act of degrading a molecule to one or more smaller molecules by biochemical mechanisms (e.g., enzyme action).

(f) Biofilm -- a slime-like matrix composed of extracellular polymer substances (EPS) within which a consortium of microorganisms flourish. These biofilms may either grow over surfaces, or occupy voids in a porous medium.

(g) Biofouling -- any deleterious event in which a definable biological activity causes a deterioration in an engineered or natural process or system. Deleterious effects range from clogging, corrosion, and plugging to gas production and bioaccumulation.

(1) Bioaccumulation -- any buildup of biomass, extracellular products and associated mineral and particulate matter associated with biofilm formation and development.
(2) Biocorrosion -- biologically induced or accelerated corrosion (equivalent term: microbially induced corrosion, MIC)

(h) Biomass -- the mass of a living entity which may be expressed as either the wet or dry weight. Biomass may furthermore be given as the total mass including all associated mass, or as the viable mass which would include just the viable cells. In biofilms, the total mass would relate to the total weight of the "slime" as such (which has potential application in planning maintenance treatment) while the viable mass would include just the mass directly associated with the living cells.

(i) Clogging -- the generation of a mass which interferes with physical functioning (e.g., hydraulic conductivity) of a porous medium (e.g., gravel pack, sand filter) or transmitting capacity of a device or pipe. Clogging can be formed through the maturation of biofilms fouling the media and may become complex in structure.

(j) Consortium (plural: consortia) (synonym: community) -- communities or associations, often interdependent, of microorganisms.

(k) Corrosion -- the process of erosive deterioration in the physical form and engineered characteristics of a structure. These processes frequently involve electrolytic and/or corrosive chemical (e.g., acids) effects which are sometimes mediated by microbial activities (biocorrosion or microbially induced corrosion). It has been observed that corrosive pitting can form directly under biofilms.

(l) Depositional biofouling -- biofouling resulting in the deposition of slime, metal oxide, and other material on a surface or in a porous medium (bioaccumulation).

(m) Disinfection -- the act of destroying by chemical and/or physical means microorganisms that are causing an undesirable infestation at a site. It does not mean that all microorganisms are killed; it means that there is a selective action.

(n) Encrustation -- a relatively solid plate-like or crystalline structure coating a surface. It appears to be chemical in nature due to the hardness of the structure. Often brittle (when dry) or plastic (when wet), the organic content is usually relatively small.

(o) Extracellular polymer substances (EPS or ECPS) -- a general term for exopolymers produced by many microorganisms, typical carbohydrate based, outside the cell (equivalent term, glycocalyx).

(p) Heterotrophic microorganisms -- those microbes which obtain their energy from the breaking down of organic (carbon-containing) material. Some of these microbes are very specialized (e.g., cellulose degraders) while others can utilize a variety of organic compounds.

(q) Iron oxidizing bacteria (IOB) -- those bacteria able to oxidize iron by any means from a reduced form of iron (ferrous form) to an oxidized (ferric) state. Some authorities define genuine IOB as those chemolithotrophs that oxidize iron metabolically.

(r) Iron reducing bacteria -- those bacteria which are able to reduce iron by any means from an oxidized form (ferric) to a reduced (ferrous) state.

(s) Iron related bacteria (IRB) -- all of those bacteria which are able to accumulate iron in another form beyond that for basic metabolic functioning. These accumulated iron compounds generally collect within the slime (EPS) around the cells and gradually harden (crystallize) over time.

(t) Maintenance monitoring -- as part of a preventive maintenance strategy, monitoring of system parameters to detect indicators of deteriorating conditions.

(u) Maintenance treatment -- a cleaning treatment applied in a preventive or proactive manner, typically before performance of the system is impaired.

(v) Microbially induced corrosion -- see Biofouling.

(w) Preventive Maintenance (PM) -- a management strategy of ongoing monitoring and preventive repair and replacement of components of a system or process to prevent or delay recognized deterioration.

(x) Rehabilitation -- the returning of a well or other system to its original specified state by the application of suitable treatments.

(y) Redox (Eh) -- oxidation-reduction potential (ORP). Oxidation and reduction reactions mediate the behavior of many chemical constituents in the environment. This is a relative scale of the intensity of electron donor activity, as measured between a suitable reference electrode and an inert indicator electrode, and typically expressed in terms of Eh volts or millivolts (plus or minus) in relation to the reference.

(z)Redox fringe -- a term applied to transition zones that develop in formations around working wells where the predominant ion state of metal changes from the reduced, dissolved form (e.g., MnII, FeII) to

the oxidized, low-solubility form (MnIV, FeIII). This zone tends to be important as a buildup point for clogging biofouling.

(aa) Shock treatment -- the application of a higher than normal chemical dose in order to maximize the effectiveness of the treatment being applied.

(bb) Slime -- a surface growth on, or originating from, a surface which may be jelly-like in form (typically EPS). Such slimes usually include various microorganisms and can act as sites for the bioaccumulation of various chemicals.

(cc) Slime forming bacteria -- bacteria which produce slimes (from EPS), but do not necessarily (or incidentally) accumulate iron within these slimes (BART acronym “SLYM” refers to these).

(dd) Sloughing -- the act of a slime, for whatever reasons, breaking up and releasing particles (from the slime) to the water passing over the slime.

(ee) Substrate (biological) -- conceptually equivalent to available organic carbon. Also used for surfaces on which biofilms attach.

(ff) Sulfate (or sulfur) reducing bacteria (SRB) -- anaerobic bacteria able to reduce sulfate (and some other sulfur species) to hydrogen sulfide. This event may initiate electrolytic corrosion and/or rotten egg taste and odors in water.